

# THE PHASMIDÆ, OR WALKINGSTICKS, OF THE UNITED STATES.

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The Phasmidæ is one of the most interesting families of the order Orthoptera. It is poorly represented in the United States, and the species, being mimetic in nature, are not commonly met with. Our forms are all apterous and are confined in their distribution to the southern half of the country, with the exception of the species of the genus *Diapheromera*, one of which extends into Canada. The name "walkingstick" is commonly applied to these insects, and the common northern species, *Diapheromera femorata* Say, is the best known representative of the family. There is a popular belief extant in some parts of the country that these insects are very poisonous to stock when eaten by them. For this reason they have been called the "mule killer," though this name is more often applied to species of the family Mantidæ, which are said to be especially fatal to that useful animal. Among other popular names given to the walkingsticks are Devil's riding horse, Prairie alligator, Stick bug, Witch's horse, Devil's darn-ing needle, Scorpion, and Musk mare, the latter applied only. I believe, to the species of the genus *Anisomorpha*.

Nowhere do we find more striking instances of protective resemblance than those afforded by members of this family of curious insects. In the tropics, where these insects abound, such amazing adaptations as the wonderful Walkingleaf, *Phyllium scythe*, and other large, winged forms are found. In the United States the species are all wingless and mimic different kinds of twigs, especially so the more slender species of the genera *Diapheromera*, *Bacunculus*, and *Parabacillus*.

The Phasmidæ are insects of very deliberate motion, especially the females. They do not depend upon locomotion for protection from their enemies, but to their deceptive resemblance and, in some cases, to the power of emitting an offensive spray from special glands situated on the prothorax.

The species are exclusively herbivorous, none being known to take animal food. One exception is recorded where some partially starved leaf insects nibbled at the foliaceous expansions of their fellows, but not enough to injure them in any way. The female of one of our species has been recorded as eating off the head of the male while under the influence of sexual excitement, but the insect in question was most surely not a Phasmid but a Mantid, as this habit is not at all uncommon among some members of that family.

Regeneration of limbs is quite common among the Phasmidæ. Such limbs are much smaller and may always be distinguished by the absence of one tarsal joint, all regenerated limbs being tetramerous. According to Scudder, if the leg be removed nearer to the body than the trochantero-femoral articulation the limb will not be replaced.

The eggs of our species are dropped at random on the ground. Oviposition takes place in the fall of the year with our common northern species and the eggs lie over winter, and sometimes even through a second, before the nymphs issue. When the young walkingstick is in the egg, ready to emerge, the meso- and metathorax are not remarkably elongate, but before the little creature is fairly out of its narrow prison the thoracic segments assume their usual proportions. It is said to be a most curious sight by those who have observed this almost instantaneous development.

In my studies of these insects specimens of all of our species have been examined, except *Diapheromera mesillana* and *carolina* and *Pseudosermyle stramineus*. The material of the U. S. National Museum forms the basis of this paper. Specimens were loaned for study by the Colorado and Oklahoma experiment stations. For various kindnesses I wish to express my sincere thanks to Professors Scudder and Bruner and Mr. J. A. G. Rehn.

The family Phasmidæ may be defined as follows:

Body elongate, subcylindrical; abdomen with ten segments, the basal one usually coalesced to the posterior part of the metathorax, sometimes entirely invisible;<sup>a</sup> all of the legs equally ambulatory; wings wholly absent in the United States species, the location of the metathoracic pair, and sometimes the mesothoracic pair also, generally indicated by a stationary wing-like pad, bearing a gland, presumably a scent gland; tarsi five jointed, except in *Timema*, terminated by two claws, between which is a large arolium; ovipositor concealed by the subgenital plate; cerci inarticulate.

<sup>a</sup> In descriptive work the first abdominal segment is spoken of as the intermediary segment and the abdomen is considered as consisting of nine segments. Thus the basal or first abdominal segment as used in the following pages is really the true second one. Likewise the seventh, eighth, and ninth segments are, respectively, the eighth, ninth, and tenth ones. The generally inconspicuous nature of the true basal segment, which is sometimes even wholly invisible, makes this nomenclature seem advisable.

The species occurring in the United States fall into four subfamilies, separated as follows.

- a. Antennæ not more than one-half as long as the anterior femora.....CLITUMNINÆ.
- aa. Antennæ distinctly longer than the anterior femora.
  - b. Mesothorax never less than four times as long as the prothorax, generally more; tibiæ not furnished at the apex beneath with a sunken areola...BACUNCULINÆ.
  - bb. Mesothorax never more than three times as long as the prothorax, generally less; tibiæ furnished at apex beneath with a sunken areola.
  - c. Coxæ visible from above; tarsi five jointed.....ANISOMORPHINÆ.
  - cc. Coxæ invisible from above; tarsi three jointed.....TIMEMINÆ.

Subfamily CLITUMNINÆ.

The insects representing this subfamily in the United States are very slender wingless walkingsticks with antennæ much shorter than the anterior femora in both sexes. The legs are slender and unarmed and the tibiæ are carinate beneath to the apex. The median segment is short and inconspicuous. Pronotum short as in *Bacunculinæ*. Cerci moderate, incurved in the male and straight in the female.

We have but one genus, which is here characterized as new.

PARABACILLUS, new genus.

*Bacillus* SCUDDER (not Latreille), Psyche, VI, 1893, p. 372.

Antennæ less than one-half as long as the anterior femora, composed of six or seven segments in the male and probably about that number in the female, but there, as also sometimes in the male, the segments are so closely connate as to be inseparable, except the first and second, which are very distinct. Head subpyriform, horizontal. Eyes small, round. Thorax with the pronotum about one-fifth as long as the mesonotum. Legs, smooth, unarmed, long and slender. Cerci as in *Diapheromera*.

Dr. Scudder considered the species of this genus to belong to the subfamily Bacillinæ and placed them in the old world genus *Bacillus*. But the absence of an areola at the apex of the tibiæ below refers them to the subfamily Clitunninæ. In many particulars the genus seems closely allied to the genus *Paraclitumnus* of Brunner von Wattenwye. We have a single species of the genus.

PARABACILLUS COLORADUS Scudder.

Plate LVII, fig. 1; Plate LVIII, fig. 1.

*Bacillus coloradus* SCUDDER, Psyche, VI, 1893, p. 372; Proc. Davenport Acad. Sci., IX, 1902, p. 21, pl. 1, fig. 4.

*Bacillus carinatus* SCUDDER, Psyche, VI, 1893, p. 372.

*Bacillus hispanicus* Bolivar, belongs to this genus, but the antennæ are composed of sixteen distinct segments. The *Bacillus palmeri* of the author, recently described from Mexico, is also a member of this genus.

The following description is that of the author,<sup>a</sup> which is quoted in full:

*Bacillus coloradus* Scudder (pl. 1, fig. 4), Baker's ranch, Beulah, Sapello Canyon, 8000' on *Monarda stricta* (Willmatte P. Cockerell); La Trementina (Alice Blake). The following description was taken from the first specimen, which is that figured:

Testaceous, more or less clouded with fuscous dorsally. Head striped feebly with fuscous, especially above and with five subequidistant delicate longitudinal carinae; whole thorax and abdomen similarly carinate, but otherwise smooth except for very minute rather sparsely scattered ferruginous granules between the dorsal and subdorsal carinae; second joint of antennae small and globular, the remainder consisting of a hardly articulate, slightly depressed, lanceolate, bluntly pointed mass.

Length of body, 48 mm.; antennae, 4.5 mm.; mesothorax, 10.5 mm.; metathorax, 8.5 mm.; abdomen, 25 mm.; hind femora, 12 mm.; width of metathorax in middle, 1.5 mm.

The above description is from a female specimen. The males are more slender, with longer antennae and legs.

From a study of a series of specimens, both male and female, from Nebraska, Colorado, New Mexico, Arizona, and California I conclude that there is but one species. They show a certain amount of variation in color and size, but afford no specific characters. The antennae of a mature pair from California measure 5 mm. in the female and 7 mm. in the male. One male from Arizona has antennae measuring 12 mm. in length. The color varies from almost wholly infuscated to a light brown. One female from California has an extreme length of very nearly 70 mm. But there are all stages of gradation between these extremes of color and size and no characters present themselves to warrant the recognition of more than the one species.

#### Subfamily BACUNCULINÆ.

The members of this subfamily are long, slender, stick-like insects with the mesothorax at least five times as long as the prothorax; antennae, except in *Sermyle*, more than twice as long as the anterior femora; tibiae without a sunken areola at apex beneath.

The slender body at once distinguishes this subfamily from the others of our fauna except Clitumninae. The long antennae, however, readily separates it from that group. We have four genera of Bacunculinae occurring in the United States. The following table will serve to separate them:

- a. Head subquadrate or subcylindrical, usually distinctly longer than broad, attached obliquely or horizontally. (Plate LVII, fig. 4.) Male cerci subequal throughout or apically trifid.
- b. Middle femora of the male not much swollen, not thicker than the posterior ones; posterior femora unarmed in both sexes.
- c. Male cerci apically trifid, head carinate or longitudinally rugose between the eyes; antennae rarely twice as long as the anterior femora.

*Pseudosermyle*, new genus.

- cc. Male cerci simple; head smooth; antennae more than twice as long as the anterior femora ..... *Bacunculus* Burmeister.

*bb.* Middle femora of the male much swollen, distinctly thicker than the posterior ones; posterior femora armed beneath on the median line near the apex with a single spine, in the male very prominent, in the female often very small and sometimes wholly absent ..... *Diapheromera* Gray.

*aa.* Head ovate, short, scarcely longer than broad, attached vertically (Plate LVII, fig. 2*a*); male cerci spatulate, much broader apically than at the base (Plate LVII, fig. 2*b*) ..... *Megaphasma*, new genus.

PSEUDOSERMYLE, new genus.

Head subcylindrical, distinctly longer than broad, horizontally attached to the thorax and in front between and behind the eyes either carinate or longitudinally rugose; antennæ no more, or but little more, than twice as long as the anterior femora; legs unarmed; basal segment of the abdomen generally subquadrate in the female, twice or more than twice as long in the male. Cerci of the female simple, of the male apically trifid.

This genus, of which *P. banksii* may be considered the type, is most nearly allied to *Sermyle* Stål, but differs in the character of the male cerci, which are simple in the latter genus.<sup>a</sup> The head of the only species of *Sermyle* examined, a female from Guatemala, is very much shorter in proportion than found in the species of *Pseudosermyle*. It is also somewhat closely allied to *Bacuncubus*, and the most stable character for its separation from that genus, exclusive of the male genital characters, seems to be the dorsally carinate or rugose head.

The males of *Pseudosermyle strigata* and *arbuscula* are unknown and it may be that these species will eventually prove to belong to *Sermyle*, but until the male sex is made known it is deemed safest to include them here.

*Pseudosermyle* is represented in the United States by five species, which may be separated by the following tables. The first table is based wholly upon the characters of the female:

- a.* Body multicarinate or longitudinally rugose.
- b.* Cerci short, no more than three times as long as the greatest width; supraanal plate subtruncate or obtusangulate at the apex.
- c.* Femora short and stout (Plate LVIII, fig. 4), the posterior ones about nine mm. in length ..... *arbuscula* Rehn.
- cc.* Femora longer and more slender (Plate LVIII, fig. 3*a*), the posterior ones about twenty mm. in length ..... *truncata*, new species.
- bb.* Cerci long, six times as long as the greatest width; supraanal plate acutely angulate at the apex ..... *strigata* Scudder.
- aa.* Body smooth ..... *stramineus* Scudder.

*Pseudosermyle banksii* does not appear in the above table for the reason that the female is unknown. The species of which the males

<sup>a</sup>The male of *Sermyle mexicanus* Saussure, the type of *Sermyle*, is not positively known, but a male specimen that Stal thought quite surely belonged to that genus had simple cerci, as in *Bacuncubus*. Besides this, other Mexican species referred to this genus have simple cerci.

are known may be separated by the following table, which is based wholly upon the characters of that sex:

- a. Seventh abdominal segment distinctly inflated on the posterior half.  
 b. Long and slender, length about 60 mm ..... *banksii*, new species.  
 bb. Shorter and less slender, length about 40 mm ..... *truncata*, new species.  
 aa. Seventh abdominal segment not inflated ..... *stramineus* Scudder.

#### PSEUDOSERMYLE ARBUSCULA Rehn.

*Sermyle arbuscula* REHN, Can. Ent., XXXIV, 1902, p. 273.

The following description of this species is taken in full from the author's article referred to above:

Type, female, San Diego, California, May 7, 1901.

This species does not seem to be very closely related to any of the previously known species of the genus. From *azteca* Saussure, it is differentiated by having the femora carinate and striate; from *saussurii* Stål, by the nonampliate sixth abdominal segment; and from *strigata* Scudder, by the more robust limbs and the less strongly striate body. With *mexicana* and *linearis* Saussure, no affinity exists.

General form slender, the thoracic portion rather robust. Head rather elongate, bearing two central longitudinal rugae, which become obscure caudad, the whole surface of the head rather tuberculate, the tubercles being longitudinally disposed; eyes subspherical, slightly exerted; antennae longer than cephalic femora; the proximal segment large and broad, with the distal section contracted, this segment over twice as large in bulk as the next. Pronotum, mesonotum, and metanotum tuberculate, the tubercles resolving into longitudinal series, this being more apparent on the metanotum, the mesonotum and metanotum being centrally carinate; pronotum rather narrow, not quite equaling the head in length; mesonotum long (with pronotum equaling the cephalic femora), the lateral margins slightly tuberculate; metanotum very considerable shorter than the mesonotum, comparatively robust, expanding in the caudal portion. Abdomen rather slender, multistriate, none of the segments exhibiting any special ampliation; ventral surface between the sixth and seventh segments exhibiting a pair of flattened longitudinal processes. Cephalic femora heavy, with the proximal diastema (found in many representatives of this family) rather well marked, the remaining section of the segment being inflated and with three prominent angles; tibiae as long as the femora, quadrate slightly tapering; first tarsal joint about as long as the succeeding ones. Intermediate femora short, triangular in section, equaling the metanotum (and median segment) in length; tibiae depressed, about equaling the femora in length; first tarsal joint considerably less than the succeeding joints in length. Caudal femora short, reaching the middle of the third abdominal segment, roughly triangular in section; tibiae rather longer, reaching to the apex of the first segment. General color, reddish brown, washed with ashy gray on the cephalic limbs.

#### Measurements.

	mm.
Length of body .....	54
Length of pronotum .....	3
Length of mesonotum .....	12
Length of metanotum (with median segment) .....	8.7
Length of abdomen .....	28
Length of cephalic femora .....	14
Length of intermediate femora .....	7.5
Length of caudal femora .....	8.7

The supraanal plate of this species is shown at Plate LVII, fig. 3, and for this drawing I am indebted to the describer. This species seems remarkable for the extreme brevity of the posterior femora.

PSEUDOSERMYLE TRUNCATA, new species.

Plate LVIII, figs. 3, 3a, 3b.

Color grayish brown. Head above with two pairs of prominent carinae, the carinae of each pair subparallel at base, flaring somewhat just beyond the middle and then rapidly converging slightly beyond the eyes by the incurving of the outer carina. Just anterior of the termination of these carinae is an elevated, posteriorly bifurcated tubercle and between the two pairs of carinae is a minute mesial carina extending halfway along the length of the head. Antennae basally thicker than in *strigata*. Pronotum above with a slight mesial longitudinal incision and with a shallow transverse furrow just behind the middle which does not extend to the borders, which are strongly ecarinate; disk with two subdorsal carinae, less distinct behind the transverse furrow, and with a couple of indistinct, less elevated carinae between them and the border of the pronotum; mesonotum, and metanotum, together with the intermediary segment and the abdomen carinated as in *strigata*, but the whole body is much less covered with tubercles, the abdomen being almost entirely destitute of them and the thorax supplied more sparingly than in that species. Legs much more robust than in *strigata* and showing traces of fuscous bands more noticeable on the middle femora. Supraanal plate broader than in *strigata* and subtruncate apically. Cerci short and comparatively broad, about three times as long as broad.

Length of body, 73 mm.; mesothorax, 16.5 mm.; metathorax, 10.5 mm.; middle femora, 15 mm.; hind femora, 20 mm.

One female, Dos Cabezos, Arizona, June, 1891.

*Type*.—No. 6613, U.S.N.M.

One immature female specimen, in poor condition, from Bright Angel, Arizona, is referred to this species. It has the posterior femora extending only to the middle of the fourth abdominal segment and the basal five segments of the abdomen are furnished posteriorly above with two prominently elevated tubercles, one on each side.

The U. S. National Museum also contains one female and six male specimens from Los Angeles County, California, that evidently belong here. The female is apparently immature, probably being in the last stage. It is 54 mm. long, and the posterior femora are 16 mm. in length. The males differ from the females in being entirely smooth except for the two main carinae on the anterior part of the head between the eyes, and in being smaller and quite slender. The cerci project obliquely downward, are trifid apically, the center branch forming the terminus of the main body of the cerci, and engage each

other at their tips. Plate LVIII, fig. 3, represents the cerci of the male of this species. In immature specimens the cerci are simple, being merely flattened and slightly concave.

The measurements of these male specimens are as follows: Length of body, 40 mm.; antennæ, 27 mm.; mesothorax, 9.5 mm.; metathorax, including the intermediary segment, 7.5 mm.; fore femora, 13.5 mm.; middle femora, 12 mm.; hind femora, 15 mm.; width of middle of mesothorax, 1.5 mm.

These Californian specimens are much lighter colored than those from Arizona, and may represent a new species, but without additional material it is not deemed advisable to describe them as such.

The type specimen was received at the Department of Agriculture on June 17, 1891. The following note regarding it is quoted from the notebook of the Division of Entomology:

Rec. from F. W. Anderson, Asst. Ed. Am. Agr., N. Y., 1 specimen, female, of a *Diapheromera*, new to the collection, received from Los Cabezos, Arizona, with the statement that it is more deadly to stock than loco-weed if eaten by them. It is called in that section "Campo mucho."

This species, while in general resembling *strigata*, is really very distinct. The broader supraanal plate with its subtruncate apex, short broad cerci, larger legs and smoother body, will at once distinguish it from that species.

#### PSEUDOSERMYLE STRIGATA Scudder.

Plate LVI, fig. 3; Plate LVIII, fig. 8.

*Sermyle strigata* SCUDDER, Cat. Orth. U. S., 1900, pp. 14, 94-95, pl. 1, fig. 3.

The author's description is as follows:

Whole body dull ashy gray. Head furnished above with four longitudinal rows of small tubercles. Whole thorax mesially carinate and also furnished above on either side with a pair of carina, all the carinae equidistant and furnished, as well as the intermediate spaces, with small sparsely scattered tubercles. Abdomen and intermediary segment similarly marked, but with an additional pair of subdorsal carinae and with fewer and much more obscure granulations, mostly confined to the carinae. Hind femora reaching to the end of the fifth abdominal segment. Abdomen nowhere expanded.

Length of body, 72 mm.; antennæ, 30 mm.; mesothorax, 18.5 mm.; metathorax, 10.5 mm.; abdomen, 35.5 mm.; hind femora, 22.5 mm.; width of middle of mesothorax, 3 mm.

Three males. Texas, Boll, Lincecum.

This species appears to fall near *S. azteca* Sauss., but differs by the carinate thorax with its dull coloring.

The cerci, as shown in the table of species, are very long, being six times longer than broad.

## PSEUDOSERMYLE STRAMINEUS Scudder.

Plate LVIII, fig. 2.

*Bacunculus stramineus* SCUDDER, Proc. Davenport Acad. Sc., IX, 1902, p. 20, pl. 1, fig. 1.

Described by the author as follows:

*Bacunculus stramineus* Scudder, sp. nov. (pl. I, fig. 1). Body very slender, flavo-testaceous, the sides of the thorax, the undersurface of the metathorax, and most of the undersurface of the middle femora white or hoary, at least in the male, the tibiae more or less tinged with green in the female; the terminal abdominal segments are more or less hoary (male) or green (female). Head a little longer than the pronotum, somewhat tumid in the female, laterally striped with white in the male, in the latter with a pair of longitudinal rugæ following behind the inner margin of the antennal scrobes; antennæ pale green (female) or testaceous, becoming apically infuscated (male), very slender and shorter than the body. Body smooth, the thorax with a feeble median carina. Seventh abdominal segment of male nearly as long as the eighth and ninth together, the ninth slightly longer than the eighth, the seventh segment not inflated, bearing beneath a bulbous body not reaching the extremity of the eighth segment with a cap which a little surpasses it; ninth segment cylindrical, equal, truncate, bearing a pair of cerci, straight, rather stout, but compressed, equal and apically very briefly and bluntly bifid plates, nearly as long as the segment.

Length of body, male, 50 mm., female, 42 mm.; antennæ, male, 22 mm., female, 26 mm.; head, male, 2.5 mm., female, 2.5 mm.; thorax, male, 23 mm., female, 18.5 mm.; mesothorax, male, 12.5 mm., female, 9 mm.; abdomen, male, 23.5 mm., female, 22 mm.; fore femora, male, 14 mm., female, 10.5 mm.; middle femora, male, 11.5 mm., female, 8 mm.; hind femora, male, 14 mm., female, 10.5 mm.; width of metathorax in middle, male, 1 mm., female, 1.5 mm. 1 male, 1 female. Between Mesilla Park and Little Mountain, July 1. (A. P. Morse.)

The female is probably not quite mature.

## PSEUDOSERMYLE BANKSII, new species.

Body very slender, testaceous, paler below. Head pale, slightly longer than the pronotum and distinctly swollen anteriorly, the sides marked with a longitudinal black stripe and with the usual longitudinal carinae on top between and behind the eyes. Body smooth, with scarcely a trace of a median carina; mesothorax much longer than the metathorax. Seventh segment of the abdomen slightly shorter than the eighth and ninth together and considerably swollen on the posterior half, and here furnished with the usual ventral appendage, which is slightly longer than the eighth segment; eighth and ninth segments subequal in length, the latter the larger and equal. The cerci are as long as the last abdominal segment, moderately slender, slightly compressed, curving very slightly downward and inward, and are apically trifid, the center branch curving inward quite abruptly and forming the terminus of the main body of the cerci.

Length of body, 64 mm.; antennæ, 50 mm.; mesothorax, 16.5 mm.; metathorax, including the intermediary segment, 12 mm.; fore femora,

25 mm.; middle femora, 22 mm.; hind femora, 25 mm.; width at the middle of the mesothorax, 1.25 mm.

One male from Brazos County, Texas, collected in September by Mr. Nathan Banks, in whose honor the species is named. Also a male from Buna, Jasper County, Texas, on November 15, 1902, by Dr. A. D. Hopkins. The latter specimen was taken on pine.

*Type*.—No. 6616, U.S.N.M.

This insect may prove to be the male of *Sermyle strigata* Scudder, but more material is needed before it can be proven. The very slender form, however, seems to militate against this.

#### BACUNCULUS Burmeister.

*Bacunculus* BURMEISTER, Handb. Ent., II, 1838, p. 566.

Burmeister established *Bacunculus* as a subgenus of *Bacteria*. As represented in the United States, the genus is defined as follows:

Very closely allied to *Diapheromera*. Head smooth in both sexes, subcylindrical, anteriorly swollen, elongate, more than twice as long as broad, and horizontally attached to the thorax. Antennæ much more than twice as long as the anterior femora. Prothorax about one-sixth as long as the mesothorax; mesothorax slightly longer than metathorax. Legs of male unarmed, slender, filiform; middle femora of male not at all swollen as they are in *Diapheromera*; legs of female usually unarmed, but the middle and posterior femora are sometimes armed below on the median line next the apex with a distinct, though usually minute, spine. Body of male more slender than in *Diapheromera* and the cerci of similar shape and relative proportion as in that genus.

The unswollen middle femora of the males make it easy to distinguish this genus from *Diapheromera*, but from female specimens alone it is more difficult. The more elongate and anteriorly swollen head together with the more generally unarmed legs will usually serve, however, to distinguish the females with considerable certainty.

In the United States we have a single species.

#### BACUNCULUS TENUESCENS Scudder.

Plate LVI, figs. 1, 2.

*Bacunculus tenuescens* SCUDDER, Cat. Orth. U. S., app., 1899, p. 95.

This species is figured on Plate I, figs. 1 and 2 of the above work, and described in the following words:

Body exceedingly slender, flavous beneath, brown (male) or green (female) above, becoming infuscated on the lower portion of the sides, forming a postocular stripe. Head greatly elongated, much longer than the pronotum; antennæ much shorter than the body. Entire body quite smooth with a very delicate mesial carination. Seventh and ninth abdominal segments of male subequal in length, slightly longer than the eighth and about half as long as the sixth, the seventh segment scarcely

inflated, bearing beneath a deflexed subspatulate convex plate, reaching the tip of the eighth segment and no broader than it; ninth segment cylindrical, equal, truncate, bearing a pair of decurved and incurved, cylindrical but slightly clavate, blunt tipped cerci, about as long as the segment.

Length of body, male, 64.5 mm., female, 53 mm.; antennæ, male, 41 mm., female, 35 mm.; head, male, 3.25 mm., female, 3.5 mm.; thorax, male, 31.5 mm., female, 25 mm.; mesothorax, male, 16 mm., female, 13 mm.; abdomen, male, 30 mm., female, 25 mm.; fore femora, male, 18 mm., female, 15.5 mm.; middle femora, male, 14.5 mm.; female, 13.5 mm.; hind femora, male, 20 mm., female, 16 mm.; width of mesothorax at middle, male, female, 1 mm.

One male, one female. Cedar Keys, Fla., June 6; Capron, Florida.

The tip of the abdomen of the female is lost.

The female from which the above description was made is evidently immature, as the measurements do not at all agree with those of mature individuals in the collection of the U. S. National Museum. The following notes are made from a mature female collected by Hubbard and Schwarz at Cedar Keys, Florida, in the month of June:

Color uniformly light greenish-brown, probably green in life. Ninth abdominal segment slightly longer than the seventh. Supraanal plate subtriangular, mesially keeled. Cerci long and slender, about as long as the last abdominal segment. Extreme length of body from front of head to tip of cerci, 85 mm., head 4.5 mm., mesothorax 19 mm., metathorax 14.5 mm., fore femora 19 mm., middle femora 16.5 mm., hind femora 20.5 mm., cerci 4 mm.; width of mesothorax at middle 2 mm.

A female specimen from Biscayne, Florida, from the Riley collection, which is referred to this species, is apparently much above the ordinary size, giving the following measurements: Extreme length of body 110 mm., head 5.5 mm., mesothorax 24 mm., metathorax 19.5 mm., fore femora 27.5 mm., middle femora 21 mm., hind femora 26 mm., cerci 4 mm. This specimen is but little thicker than moderate-sized individuals and shows no peculiarities indicative of a new species.

The brown color of the males of this species varies from light to quite dark, and the legs, probably also the body in some specimens, are greenish-brown.

#### DIAPHEROMERA Gray.

*Diapheromera* GRAY, Syn. Phasm., 1835, p. 18.

This genus has the following characters:

Head smooth in both sexes, subquadrate or subcylindrical, usually less than twice as long as broad and obliquely attached to the thorax; antennæ much more than twice as long as the anterior femora; prothorax usually less than one-fourth as long as the mesothorax; meso- and metathorax subequal in length. Body linear, especially in the male; basal segment of abdomen oblong, in male twice as long as broad. Middle femora much swollen in the male, distinctly thicker than the hind ones, those of the female scarcely swollen and not distinctly larger than the hind ones. Posterior femora armed beneath on median line near the apex with a single spine, in the male large and distinct, in the

female sometimes large and distinct but usually much smaller than in the male and sometimes minute or even wholly absent. Cerci of male cylindrical, longer than the last abdominal segment and, except in *D. mesillana*, strongly incurved.

Our common northern walkingstick belongs to this genus, the species of which are distributed more widely over our country than those of any other of our genera. None of the species have been found west of the Rocky Mountains. Five species occur in the United States. They may be separated by the following table, which is for the greater part taken from a paper on this genus by Dr. Scudder:<sup>a</sup>

- a. Male cerci strongly incurved.
- b. Ninth abdominal segment of male subequal, scarcely larger at apex than at base, the seventh segment much longer than the eighth; male cerci with a basal tooth.
- c. Inner ventro lateral carina of the posterior femora with minute serrations; meso- and metathorax unicolorous.
- d. Male cerci with a blunt tooth at inner inferior base (Plate LVIII, fig. 6); female cerci relatively stout, about half as long as the last dorsal segment. *femorata* Say.
- dd. Male cerci with a sharp thorn at inner inferior base (Plate LVIII, fig. 5); female cerci relatively slender, almost or quite as long as the last dorsal segment. *reliei* Walsh.
- ce. Inner ventro-lateral carina of the posterior femora smooth; meso- and metathorax longitudinally marked with black beneath. *arizonensis*, new species.
- bb. Ninth abdominal segment of male apically inflated, and here nearly half as broad again as at base, the seventh and eighth segments of subequal length; male cerci without a basal tooth. *carolina* Scudder.
- aa. Male cerci rigidly straight. *mesillana* Scudder.

#### DIAPHEROMERA FEMORATA Say.

Plate LVII, fig. 4; Plate LVIII, fig. 6.

*Spectrum femoratum* SAY, Exp. Long., II, 1824, p. 297; Amer. Ent., III, 1828, p. 37, pl. XXVII.—LEIDY, Proc. Acad. Nat. Sci. Philad., III, 1846, pp. 80-84.

*Diapheromera femorata* HARRIS, Treat. Ins. Inj. Veg., 1840, p. 119.—SCUDDER, Psyche, IX, 1901, p. 188.

*Phasma (Bacteria) femorata* HAAN, Bijdr. kenn. Orth., 1842, pp. 101, 134.

*Bacuncululus femoratus* UHLER, Harris, Treat. Ins. Inj. Veg., 3d ed., 1862, p. 146.

*Diapheromera sayi* GRAY, Syn. Phasm., 1835, p. 18.

*Bacteria sayi* CHARPENTER, Orth. descr., 1841-1845, pl. IV.

*Bacteria (Bacuncululus) sayi* BURMEISTER, Handb. Ent., II, 1838, p. 566.

*Bacuncululus sayi* THOMAS, Trans. Ill. St. Agric. Soc., V, 1865, p. 441.

*Bacteria linearis* GOSSE, Lett. Alab., 1859, p. 275.

Color fuscous or green, the males more often exhibiting the latter color. Mature individuals, especially the females, are almost always fuscous during the autumn months. The middle femora of the dark colored males are distinctly banded with lighter color.

Head smooth in both sexes, subquadrate, scarcely elongate, obliquely

<sup>a</sup> Psyche, IX, 1901, pp. 187-189.

attached to the thorax; eyes round, slightly more prominent in the male than in the female. Antennae long and slender, about as long as the body; prothorax short, about one-fifth as long as the mesothorax, the dorsal cruciform impression distinct, especially the transverse incision; meso- and metathorax subequal in length, without median carina. Legs of male long and slender, except the middle femora, which are much swollen and distinctly thicker than the others; of the female, shorter in proportion, and the middle femora are not swollen, no thicker than the others. Fore legs unarmed, undulate and smaller at the base; hind and middle femora of the male armed beneath on the median line near the apex with a large, prominent spine; of female, similarly armed, but the spine is much smaller, often quite minute. Abdomen smooth; intermediary segment visible only from above and firmly united to the metathorax; basal segment elongate, nearly or quite twice as long as broad in the female and three times as long as broad in the male; seventh segment in the male distinctly longer than the ninth and three times as long as the eighth. Cerci of male somewhat longer than the terminal segment of the abdomen, cylindrical, oval at apex, bluntly tubercled interiorly at base, clothed with microscopic stiff hairs and strongly curved horizontally inwards, usually crossing each other at about the middle; female cerci straight, stout, acuminate, less than half as long as the terminal segment of the abdomen, and partially concealed from above by the exposed tip of the triangular supraanal plate, which, as well as the cerci, is sparsely covered with very short hairs of microscopic size.

Length of body, male, 72 mm., female, 70 mm.; mesothorax, male, 17 mm., female, 16 mm.; metathorax, male, 16 mm., female, 13.5 mm.; middle femora, male, 15.5 mm., female, 11.5 mm.; hind femora, male, 19.5 mm., female, 15 mm.; hind tibia, male, 25 mm., female, 16 mm.

The above description was drawn up from a male and female collected in copulation at Rosslyn, Virginia, on September 12, 1900. The males are quite uniform in size, but the females are quite variable, the one from which the above measurements were taken being a small specimen. A large female from Massachusetts before me gives the following measurements: Length of body, 92 mm.; mesothorax, 19 mm.; metathorax, 17 mm.; middle femora, 14.5 mm.; hind femora, 18.5 mm.; hind tibia, 20 mm.

This species is our most common phasmid and occurs throughout the northern part of the country from the Rocky Mountains eastward. It is said to also occur as far south as Mexico, but is more rare in the South, being quite generally replaced there by the next species, *veliei*. Many of the southern records pertain to allied species mistaken for *femorata*.

These insects mate in the autumn and pairs are often seen in the act

of copulation. The female drops the eggs at random in the woods, where they lie till the following spring before hatching. Eggs deposited on November 9 and kept indoors gave forth the young during the last week of the following March. Some eggs are slow in giving forth the nymphs and so the insect may be found in various stages of development all through the season. Some of the eggs lie through even the second winter before hatching. The young are said to pass through but two stages in the course of growth, which averages less than two months. The newly hatched nymphs are of a uniform pale yellowish-green color and measure about 5 mm. in length, ones reared at the insectary of the Division of Entomology giving the following measurements: Length of body, 8 mm., hind femora, 3.5 mm. The young are said to live on low herbage and drop to the ground when disturbed. There is but one generation annually.

This is the only one of our phasmids that is of economic importance. It has been recorded as occurring in injurious numbers on forest trees. In such cases burning over the ground in winter to kill the eggs is recommended.

#### DIAPHEROMERA VELIEI Walsh.

Plate LVIII, fig. 5.

*Diapheromera velii* WALSH, Proc. Ent. Soc. Philad., III, 1864, pp. 409-10.—  
SCUDDER, Psyche, IX, 1901, p. 189.

This species may be defined as follows:

Of the same size and form as *D. femorata*, and also agreeing with it in being dimorphic in color, both brown and green forms occurring. It differs from that species in the following particulars: Head slightly more elongate; middle femora of male not usually banded with gray; seventh abdominal segment of the male no longer than the ninth, while in *femorata* it is one-fourth longer. Male cerci with a sharp spine or tooth at the base on the inner side instead of a blunt tubercle; female cerci nearly or quite as long as the apical segment of the abdomen instead of less than half as long, and they are usually more slender than in *femorata*. In general, the color of the dark form of *veliei* seems to be somewhat lighter than that of the corresponding form of *femorata*, but in this respect both species are variable.

This species is more southern in its distribution than *femorata*. It occurs east of the Rocky Mountains from Nebraska to Maryland, south to Georgia and Texas. It occurs also in Mexico. It was described from Nebraska, and Scudder reports it from a number of States within the region specified above. I have seen specimens from Virginia, Kansas, Oklahoma, Texas, and Colorado. Some of the females from Oklahoma have the spine beneath the posterior and intermediate femora entirely aborted, causing them to be separable from

the females of *Bacunculus* only with great difficulty. The shape of the head and the association of the males with the females, however, made the identification quite certain.

DIAPHEROMERA ARIZONENSIS, new species.

Slenderer than *D. femorata*, uniformly light yellowish brown, with the meso- and metathorax longitudinally marked beneath with shiny black. Antennae nearly as long as the body and concolorous with it. Thorax smooth, with a very slight median carina; mesothorax slightly longer than the metathorax; seventh segment of the abdomen distinctly longer than the ninth, somewhat constricted on the anterior third; ninth segment with the posterior margin concave, exposing the tip of the triangular supraanal plate. Cerci shaped as in *femorata* and *veliei*, with the basal tooth intermediate between those species. Legs long and slender, the middle femora related; less swollen than in allied species.

Length of body, 76 mm.; antennae, about 65 mm.; mesothorax, 18 mm.; metathorax, 16.5 mm.; middle femora, 18 mm.; hind femora, 22.5 mm.

One male, Hot Springs, Arizona, June 28, 1901. Collected by Messrs. Schwarz and Barber.

*Type*.—No. 6612, U.S.N.M.

This species is closely allied to *femorata* and *veliei*, but can be distinguished from them by the characters given in the table and by the more slender form. The elongate seventh abdominal segment will readily separate it from *veliei*. It is quite a characteristic-looking species, though the differences that separate it from its allies are difficult to define.

DIAPHEROMERA CAROLINA Scudder.

*Diapheromera carolina* SCUDDER, Psyche, IX, 1901, p. 188.

The following is the description as given by the author:

Stouter than *D. femorata*, testaceo-castaneous, glistening, the thorax with a rather broad median bronze-fuscous stripe, not reaching the median segment, and interrupted at the posterior end of the mesonotum, the fore legs greenish, the antennae testaceous; thorax with excessively fine transverse striation. Mesothorax and metathorax (including median segment) of similar length. Seventh and eighth abdominal segments of subequal length, each faintly enlarging from base, the ninth a little shorter, apically inflated and subglobose, nearly half as broad again at apex as at base, the cerci much as in *D. femorata*, but stouter, more compressed, and without basal tooth.

Length of body, 67 mm.; head, 3 mm.; mesothorax, 13.5 mm.; fore femora, 20.5 mm.; hind femora, 19.5 mm.

One male. North Carolina. (Morrison.)

## DIAPHEROMERA MESILLANA Scudder.

*Diapheromera mesillana* SCUDDER, Psyche, IX, 1901, p. 189.

The original description is here given in full.

Slenderer than *D. femorata*, uniform greenish flavous, the antennæ infuscated beyond the basal third, the thorax smooth, with an obscure median carina; subapical inferior spine of middle and hind femora rather slight. Mesothorax and metathorax (including median segment) of equal length. Seventh and ninth abdominal segments subequal in length and distinctly longer than the eighth, all equal in width and nowhere enlarged, the ninth rather feebly and angularly emarginate, exposing a small, transverse, apically arcuate, supraanal plate; cerci about as long as the ninth abdominal segment, rigidly straight, directed backward and not at all downward, slender tapering, blunt tipped, externally convex, and internally concave.

Length of body, 55 mm.; head, 3 mm.; antennæ, circa 37 mm.; mesothorax, 12.5 mm.; fore femora, 14.5 mm.; middle femora, 11 mm.; hind femora, 13.5 mm.

Two males. Between Mesilla and Las Cruces, New Mexico, June 30. (A. P. Morse.)

## MEGAPHASMA, new genus.

Head smooth, rounded, subvertical; antennæ more than twice as long as the anterior femora; prothorax one-fifth as long as the mesothorax and transversely incised; meso- and metathorax subequal in length and with a distinct, though slight, median carina. Middle and hind femora swollen in both sexes, the middle ones somewhat larger than the posterior ones in the male, and both the middle and posterior pairs in both sexes armed beneath on the median line next the apex with a prominent spine and sometimes, at least in the female, with a row of equally large ones extending along the entire length of the femora below.

This genus is erected for that large Southern walkingstick described by Stål as *Diapheromera dentricus*. This insect exhibits characters that are certainly of generic value. The rounded, subvertical head, broad, spatulate cerci and unusually large size will readily separate it from all other of our genera. *Diapheromera* is the most nearly allied genus, but the characters given in the table will at once separate it from that genus of much smaller insects.

In the United States we have a single species.

## MEGAPHASMA DENTRICUS Stål.

Plate LVII, fig. 2, 2a, 2b.

*Diapheromera dentricus* STÅL, Rec. Orth., III, 1875, p. 76.—SCUDDER, Psyche, IX, 1901, p. 187; Harpers Mag., LXXXVIII, 1894, p. 456, fig. 1.

This species was originally described from Opelousas, Louisiana. The following description is made from specimens, male and female, in the U. S. National Museum collection:

Yellowish brown or fuscous. Head rounded, subvertically attached

to the thorax. Antennæ multiarticulate,<sup>a</sup> more than twice as long as the anterior femora. Cruciform impression on the pronotum distinct, meso- and metathorax subequal in length and furnished above with a scarcely perceptible delicate median carina. Ninth abdominal segment slightly longer than the seventh. Legs stout, anterior ones unarmed and but half as thick as the others; posterior and middle tibiæ deeply denticulate below on the median carina, which is considerably elevated and terminated at the apex in a blunt spine, as is also the posterior ventro-lateral carinæ. The posterior and intermediate femora are large and regularly trapezoidal in form, each border below denticulate and spined on the median line with small apinules, except the terminal one, which is very large in the male. In the female all the spines are often large, but not so large as the terminal one of the male; the femora are broadest on the lower side and slightly swollen toward the base. The male femora are somewhat more rounded than those of the female. Posterior femora extending to the apex of the third abdominal segment in the female and almost to the middle of the fourth in the male; margins above coxal cavities slightly expanded and dentate. Cerci stout, in female less than one-half as long as the last abdominal segment; in male expanded apically, somewhat spatulate and directed strongly downward.

The original description, which was made from the female sex alone, gives the following measurements: Length of body 123 mm.; thorax 53 mm.; mesothorax 24 mm.; metathorax 24 mm.; abdomen 70 mm.; fore femora 27 mm.; middle femora 20 mm.; posterior femora 23 mm.; width of middle of mesothorax 5 mm.

Often the general color is reddish brown, legs lighter. A specimen in the U. S. National Museum collection has the middle and hind femora and the posterior two-thirds of the prothorax green, variegated with light gray and brown; on the femora the gray is grouped together in the form of broad, illy defined bands. Other specimens have the anterior portion of the prothorax and mesothorax, both above and below, greenish black.

This insect has been recorded from Louisiana, Texas, New Mexico, and, with doubt, from Alabama. One female specimen in the U. S. National Museum is from East Joplin, Missouri, the most northern locality yet recorded for this species.

This is the largest walkingstick that occurs in the United States, a female before me measuring 145 mm., which is 5 mm. less than one in the collection of the Academy of Natural Sciences of Philadelphia. This species suggests tropical forms more than anything else in our

<sup>a</sup>The antennal segments of a male specimen from Texas were counted and were found to number just seventy-eight. The antennæ of the specimen figured is drawn nearly twice too thick, except basally.

fauna, and the large size commands attention wherever seen. Mr. Mitchell, of Victoria, Texas, informs me that they are not uncommon in the wooded bottoms in that vicinity, where they occur on grape vines.

Subfamily ANISOMORPHINÆ.

In this subfamily the antennæ are more than twice as long as the anterior femora. Tibiæ furnished with a sunken areola below next the apex; coxæ visible from above; tarsi distinctly pentamerous. Mesothorax not more than three times as long as the prothorax. Intermediary segment invisible.

We have a single genus of this subfamily in the United States.

ANISOMORPHA Gray.

*Anisomorpha* GRAY, Syn. Phasm., 1835, p. 18.

This genus, as represented in the United States, has the following characters:

Head not more than one and one-half as long as broad, horizontally attached to the thorax. Body broad and stout, especially in the female; prothorax furnished with distinct odoriferous glands; meso- and meta-thorax subequal in length. Legs stout and thick, unequal, the middle pair the shortest; abdominal segments subquadrate or transverse, especially in the female, the seventh and ninth subequal in length, intermediary segment invisible. Cerci short, rounded, similar in both sexes.

We have two closely allied species, one occurring more commonly in the extreme Southern States and the other ranging farther north. Their differences are comparative and may be tabulated as follows:

- a.* Female, color generally yellowish brown with conspicuous broad black dorsal and lateral stripes. Head noticeably longer than broad; body more elongate, seven to nine times as long as broad. Male, color and head as in female. Body still more elongate, about twelve times as long as broad, averaging about 45 mm. in length ..... *buprestoides* Stoll.
- aa.* Female, color uniformly ferruginous of various shades or inconspicuously striped with very narrow dusky dorsal and lateral stripes. Head less noticeably longer than broad. Body proportionately shorter and broader, six to six and one-half times longer than broad. Male, color same as female. Head and proportions about the same as in *buprestoides* but smaller, averaging no more than 35 mm ..... *ferruginea* Palisot.

ANISOMORPHA BUPRESTOIDES Stoll.

Plate LIX, fig. 1.

*Pasma buprestoides* STOLL, Rept. Spectr., 1787-1813, p. 68, pl. XXIII, fig. 87.

*Anisomorpha buprestoides* GRAY, Syn. Phasm., 1835, p. 19.—SCUDDER, Can. Ent., XXVII, 1895, p. 30.

*Pasma (Anisomorpha) buprestoides* HAAN, Bijdr. Kenn. Orth., 1842, p. 101.

*Spectrum birittatum* SAY, Amer. Ent., III, 1828, pl. XXXVIII.

*Spectrum vittata* JAEGER, Life N. Amer. Ins., 1854, p. 123.

The following description of this common Southern walkingstick is made from a series of both sexes in the collection of the United States National Museum.

Color varying shades of yellowish brown, often almost fuscous, with conspicuous broad, black stripes extending from the front of the head to the tip of the abdomen, one dorsal and one on each side. These stripes, in dark-colored individuals, are often more or less confused, but in light-colored specimens they are very conspicuous and well defined. Some specimens, apparently killed soon after transformation, are paler in color and with the stripes narrow and indistinct. Legs short and stout, unequal, the middle pair the shortest, in male more slender than in the female, dark colored, except in light-colored individuals, where they are colored the same as the body: the tibiae and femora of each pair of legs are subequal in length. Head noticeably longer than broad, horizontally attached to the thorax and subquadrate in shape, somewhat swollen anteriorly. Antennae about three times as long as the anterior femora, the fourth segment the shortest. Prothorax mesially incised and transversely sulcate in the middle, about twice as long as broad, usually more than one-third as long as the mesothorax, furnished above on each well-elevated border in front with a prominent gland, opening laterally from which is ejected a pungent spray when the insect is excited. Meso- and metathorax subequal in length, the former usually slightly the longer and on the disk sometimes furnished, especially toward the sides, with several granules, often quite acute: there is no median carina. Abdomen smooth, without carina, segments, especially the basal ones of the female, subquadrate or transverse, in the male usually somewhat longer than broad, intermediary segment invisible. In the female the seventh segment beneath forms a large scoop-shaped process, at the base of which are situated the genital organs. Cerci short, in the female no more than one-half as long as the last abdominal segment, in the male almost as long as the apical segment, straight and subcylindrical in both sexes, projecting subhorizontally backward in the female and subperpendicularly downward in the male. The male usually has the tip of the abdomen curved under.

Measurements made from a mated pair from Key West, Florida, are as follows: Length of body, male 45 mm., female 61 mm.; head, male 3.5 mm., female 6 mm.; antennae, female 40 mm.; prothorax, male 3.5 mm., female 6 mm.; mesothorax, male 7 mm., female 12 mm.; metathorax, male 6 mm., female 10 mm.; fore femora, male 9.5 mm., female 13 mm.; middle femora, male 7 mm., female 10.5 mm.; hind femora, male 9.5 mm., female 14 mm.; width of head, male 2.5 mm., female 4 mm.

This species, which is sometimes called the musk mare, seems to occur most commonly in the extreme Southern States. The U. S.

National Museum contains over twenty specimens, all from Florida, except some without labels, which are probably from Mississippi. It has been recorded from various localities in the southeastern part of the United States, but the more northern records doubtlessly belong to the next species. Several young specimens referable to this species are uniformly brownish gray in color, but otherwise resemble the adults.

**ANISOMORPHA FERRUGINEA** Palisot de Beauvois.

Plate LIX, fig. 2.

*Phasma ferruginea* PALISOT DE BEAUVOIS, Ins. Afr. Amer., 1805-1821, p. 167, pl. XIV, figs. 6, 7.

*Anisomorpha ferruginea* GRAY, Syn. Phasm., 1835, p. 18.

*Phasma (Anisomorpha) ferruginea* HAAN, Bijdr. Kenn. Orth., 1842, p. 101.

This species is very closely allied to the preceding one. The color is in general lighter than in *buprestoides* and usually uniform, and not conspicuously marked by black stripes as in that species, sometimes with narrow stripes, more often noticeable in the males. The head is usually less noticeably longer than broad, and the body is proportionately shorter and broader as tabulated above. The males average less in size and the habitat seems to extend farther north than that of *buprestoides*. The measurements from a pair from Tallulah, Georgia, are as follows:

Length of head, male 3 mm., female 5.5 mm.; body, male 31 mm., female 50 mm.; fore femora, male 8 mm., female 10 mm.; middle femora, male 5.5 mm., female 8.5 mm.; hind femora, male 8 mm., female 11 mm.; prothorax, male 2.5 mm., female 5 mm.; mesothorax, male 5 mm., female 9.5 mm.; metathorax, male 4 mm., female 8.5 mm.; width of head, male 2 mm., female 4.5 mm.

This species appears to extend farther north than *buprestoides*, but it also occurs in Florida. The specimens in the collection of the United States National Museum are from Florida, Louisiana, Kentucky, and Pennsylvania.

This species, as well as the preceding one, is said to be able to throw a colored fluid to a considerable distance from the well-developed scent glands, situated on the thorax.

**TIMEMINÆ**, new subfamily.

This subfamily presents the following characters:

Antennæ longer than the anterior femora; tibiæ furnished beneath at the apex with a sunken areola; coxæ invisible from above; tarsi three jointed. Intermediary segment as distinct as the rest of the abdominal segments, freely articulated to the thorax and not at all connate with it as in all other of our groups.

This well-defined subfamily is proposed for the genus *Timema* of

Scudder. The structure of the insects here included is different from all other of our Phasmidae, as is shown by the legs being attached beneath the body in such a manner as to conceal the coxæ from above. The three-jointed tarsi are also peculiar to this subfamily. The three-jointed tarsi are obviously the result of a union of the first three segments of the normal pentamerous phasmid tarsus. This is indicated by the lower surface of the first segment showing obscure segmentation where the original segments have united.

We have but one genus of this interesting subfamily in the United States.

TIMEMA Scudder.

*Timema* SCUDDER, Can. Ent., XXVI, 1895, p. 30.

The characters limiting this genus are:

General form short and broad, not linear, head subquadrate, no longer than broad, as broad as the thorax. Antennæ much longer than the anterior femora, basal segment very large, three times as long as broad, enlarged apically. Prothorax quadrate, not narrowed anteriorly, no shorter than the metathorax and without distinct odoriferous glands; meso- and metathorax subequal in length. Legs short and stout; cerci of male forcipulate, irregular in shape and curving inwards, of female stout, vertically flattened and straight, in both sexes longer than the last abdominal segment.

We have a single species.

TIMEMA CALIFORNICA Scudder, new species.

Plate LVII, fig. 5; Plate LVIII, figs. 7, 7<sup>a</sup>.

This species, the type of the genus, has never been described. Dr. Scudder has very kindly furnished the following description, which is here published for the first time:

Head large, thorax depressed, abdomen depressed cylindrical, expanding somewhat posteriorly, the whole body smooth, glistening a little, nearly uniform luteotestaceous with a faint greenish tinge, the abdomen slightly lighter in tint than the thorax, the latter striped longitudinally and narrowly with brownish fuscous, most distinctly in a submarginal stripe, in which are fuscous impressed puncta. Antennæ about as long as head and thorax together. All the legs short, the hind femora about as long as the first three abdominal segments. Last abdominal segment of male somewhat expanded and tumid, the hind margin sinuato-truncate, the cerci about as the last segment, asymmetrical, tortuous, abruptly incurved, basally depressed, apically tapering to a point.

Length of body, male 14.25 mm.; female 22.5 mm.; antennæ, male 5.25 mm.; female 7 mm.; mesonotum, male 1.5 mm.; female 2.5 mm.; hind femora, male 3.25 mm.; female 4.5 mm. One male, one female, Santa Cruz Mountains, California. (L. Bruner.)

The U. S. National Museum contains three typical specimens of this species, two males and one female, from Santa Cruz Mountains, Cali-

fornia, collected by Albert Keobele. The antennæ of the males are broken, but those of the female are intact and measure 14 mm. in length and are 22 jointed. It would therefore appear that the antennæ of Dr. Scudder's specimens, at least those of the female, were broken.

The trochanters of these insects are large and distinct, more so than in any other of our Phasmidæ. The head is marked by a narrow post-ocular stripe, which extends more or less distinctly across the entire length of the pronotum.

Besides these specimens from the Santa Cruz Mountains, the U. S. National Museum contains a male and a female from Los Angeles County, California, that may represent a new species, but their condition is too poor to warrant their description as such without additional and better preserved material. They differ from the typical specimens in being proportionately shorter, head more flattened vertically, without the postoculate black line, and, together with the pronotum in the male, rugose above. The female cerci are more slender, and the meso- and metathorax of both sexes seem less developed than in the specimens from Santa Cruz Mountains. The male cerci also differ in being more foliaceous. Plate LVIII, fig. 7<sup>a</sup>, shows the male cerci of the specimen from Los Angeles County, and Plate LVIII, fig. 7, the same of the Santa Cruz Mountain specimens.

This species apparently represents a step in the transition from the Phasmidæ to the Forficulidæ. The forcipal cerci of the males, ventrally attached legs, short, broad head, and especially the short, stout legs with the three jointed tarsi, indicate a relation to the ear-wigs. As Phasmids these creatures are certainly anomalies, and at a casual glance are not always readily recognized, having, in one instance at least, been mistaken for a species of Perlid larvæ.

#### NOTE.

Since this paper has been made up into pages, Mr. E. A. Schwarz collected a specimen of Phasmidæ representing a species new to our fauna. It was taken at Key West, Florida, on April 6, and, except for the discordant factor of the median segment being slightly shorter than the metathorax, seems to fall quite naturally into the Bacterid genus *Haplopus* of Gray. As the specimen is an immature female, any attempt at specific determination would be unsatisfactory. It may eventually prove to be the *Haplopus cubensis* of Saussure, but it does not seem to agree very well with the description of that species.

EXPLANATION OF PLATES.

PLATE LVI.

(After Scudder.)

- Fig. 1. *Bacunculus tenuescens* Scudder, male.  
 2. *Bacunculus tenuescens* Scudder, male, side view of the tip of the abdomen.  
 3. *Pseudosermyle strigata* Scudder, female.

PLATE LVII.

- Fig. 1. *Parabacillus coloradus* Scudder, male.  
 2. *Megaphasma dentricus* Stål, male.  
 2<sup>a</sup>. *Megaphasma dentricus* Stål, male, side view of head and pronotum.  
 2<sup>b</sup>. *Megaphasma dentricus* Stål, male, side view of the tip of the abdomen.  
 3. *Pseudosermyle arbuscula* Rehn, female, end of the abdomen.  
 4. *Diapheromera femorata* Say, male, side view of head and pronotum.  
 5. *Timema californica* Scudder, female.

PLATE LVIII.

- Fig. 1. *Parabacillus coloradus* Scudder, female (after Scudder).  
 2. *Pseudosermyle stramineus* Scudder, male (after Scudder).  
 3. *Pseudosermyle truncata*, new species, male, side view of the tip of the abdomen.  
 3<sup>a</sup>. *Pseudosermyle truncata*, new species, female, right middle leg.  
 3<sup>b</sup>. *Pseudosermyle truncata*, new species, female, tip of abdomen.  
 4. *Pseudosermyle arbuscula* Rehn, female, right middle leg.  
 5. *Diapheromera veliei* Walsh, male, end of abdomen.  
 6. *Diapheromera femorata* Say, male, end of abdomen.  
 7. *Timema californica* Scudder, male, end of abdomen.  
 7<sup>a</sup>. *Timema californica* Scudder, variety, male, end of abdomen.  
 8. *Pseudosermyle strigata* Scudder, female, end of abdomen.

PLATE LIX.

- Fig. 1. *Anisomorpha luprestoides* Stål, female.  
 2. *Anisomorpha ferruginea* Palisot de Beauvois, female.